UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/795,997	03/10/2004	Kunihiko Nashimoto	1309.43634X00	4244

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MATTINGLY, STANGER, MALUR & BRUNDIDGE, P.C.
1800 DIAGONAL ROAD
SUITE 370
ALEXANDRIA, VA 22314

EXAMINER
THOMAS, SHANE M

ART UNIT	PAPER NUMBER
2186	

DATE MAILED: 08/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

	Office Action Summary	**Application No.** 10/795,997	**Applicant(s)** NASHIMOTO ET AL.
		Examiner Shane M. Thomas	**Art Unit** 2186

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _10 March 2004_.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-20_ is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-9,11 and 20_ is/are rejected.

7)☒ Claim(s) _10 and 12-19_ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _10 March 2004_ is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☒ All   b)☐ Some *   c)☐ None of:

      1.☒ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage

        application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _3/10/04, 6/15/04_.

4)☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application (PTO-152)

6)☒ Other: _IDS filed 6/15/05_.

DETAILED ACTION

This Office action is responsive to the application filed 3/10/2004. Claims 1-20 are presented for examination.

The examiner requests, in response to this Office action, any reference(s) known to qualify as prior art under 35 U.S.C. sections 102 or 103 with respect to the invention as defined by the independent and dependent claims. That is, any prior art (including any products for sale) similar to the claimed invention that could reasonably be used in a 102 or 103 rejection. This **request** does not require applicant to perform a search. This request is not intended to interfere with or go beyond that **required** under 37 C.F.R. 1.56 or 1.105.

The request may be fulfilled by asking the attorney(s) of record handling prosecution and the inventor(s)/assignee for references qualifying as prior art. A simple statement that the query has been made and no prior art found is sufficient to fulfill the request. Otherwise, the fee and certification requirements of 37 CFR section 1.97 are waived for those documents submitted in reply to this request. This waiver extends only to those documents within the scope of this request that are included in the application's first complete communication responding to this requirement. Any supplemental replies subsequent to the first communication responding to this request and any information disclosures beyond the scope of this are subject to the fee and certification requirements of 37 CFR section 1.97.

In the event prior art documentation is submitted, a discussion of relevant passages, figs. etc. with respect to the claims is requested. The examiner is looking for specific references to 102/103 prior art that identify independent and dependent claim limitations. Since applicant is

most knowledgeable of the present invention and submitted art, his/her discussion of the

reference(s) with respect to the instant claims is essential. **A response to this inquiry is greatly**

appreciated.

The examiner also requests, in response to this Office action, that support be shown for

language added to any original claims on amendment and any new claims. That is, indicate

support for newly added claim language by specifically pointing to page(s) and line no(s). in the

specification and/or drawing figure(s). This will assist the examiner in prosecuting the

application.

Information Disclosure Statement

The information disclosure statements (IDS) submitted on 3/10/2004, 6/15/2004,

6/6/2005 have all been considered by the Examiner. A signed copy of each has been attached.

Specification

The specification has not been checked to the extent necessary to determine the presence

of all possible minor errors. Applicant's cooperation is requested in correcting any errors of

which applicant may become aware in the specification.

Claim Objections

Claims 1-20 are objected to because of the following informalities:

As per claim 1, the term --the online logical volume-- should be amended to --*a* online logical volume-- as the term --*the* online logical volume-- has not been previously defined

As per claim 2, the term --*the* designated logical volume-- has not been previously defined; the Examiner recommends amending the term to --the *online* logical volume--.

As per claim 7, the term --*the* designated logical volume-- has not been previous defined in the claims. The Examiner recommends amending the term to --a logical volume designated by the second command--.

As per claim 8, the Examiner recommends amending the phrase --is possible-- to --may then commence-- as the phrase --is possible-- does not properly characterize the Applicant's intent to only begin a recovery operation once the desired logical volumes is offline.

As per claim 10, the term --the designated logical volume-- has not been previously defined in the claims; the Examiner recommends amending the term to --the online logical volume that is designated by the path cancellation--. Further, the term --the path cancellation-- should be amended to --path cancellation-- as the term --*the* path cancellation-- has not been previously defined in the claims.

As per claim 12, the term --the subvolume-- should be amended to --a subvolume-- as the former term was not previously defined.

Claims 3-6,9,11 and 13-20 are objected to as being dependent on objected base claims. Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 5,6, 8, 9, 11 and 20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

As per claims 5 and 6, line 4 does not define to where or from where the --receiving-- of the recovery instruction information occurs. It is the Applicant's duty to particularly point out and distinctly claim the subject matter which the Applicant regards as his invention. Nonetheless, for the purposes of examination, the Examiner shall consider the claims with a broadest reasonable interpretation such that the receiving of the recovery instruction information can occur to anywhere in the storage control subsystem and may be sent from anywhere.

As per claim 8, it is not clear whether the recovery process of --the logical volumes-- is referring to the --plurality of logical volumes-- [of which information is maintained in the control memory as defined in claim 1] or to the --recovery-destination logical volumes-- subset, as the term --*the logical volumes*-- lacks antecedent basis. Nonetheless for the purposes of examination, the Examiner shall regard the term --the logical volumes-- to be the *recovery-destination* logical volumes.

As per claim 9, the Applicant's specification does not disclose the --control memory--, itself, functioning to prevent path cancellation, rather, the disclosure teaches on page 49 ¶ and continuing to page 50 that the disk array controller performs the prevention step. The control memory merely contains information that is utilized by he disk array controller to prevent path

cancellation. It is the Applicant's duty to particularly point out and distinctly claim the subject matter which the Applicant regards as his invention. Nonetheless, for the purposes of examination, the Examiner shall consider the disk array controller as functioning so that the path cancellation is not executed.

As per claim 11, claim 10, from which claim 11 depends, clearly states that path cancellation with respect to the designated logical volume is executed. Claim 11 states that the path cancellation is not executed, and therefore renders claim 11 indefinite. As claim 11 depends from claim 10, which it undermines, no ascertainable interpretation can be applied by the Examiner.

As per claim 20, it is not clear whether the term --the system-- is referring to --the storage control subsystem--, the --separate storage control subsystem-- or a --system-- not previously defined in the claims--, as the term --*the system*-- lacks antecedent basis. Nonetheless, for the purposes of expedited examination, the Examiner shall interpret the term --the system-- to be the --the storage control subsystem--.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the

basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-6 are rejected under 35 U.S.C. 102(b) as being anticipated by Kitamura et al.

(U.S. Patent Application Publication No. 2002/0091828).

As per claim 1, Kitamura shows a --storage control subsystem-- (herein SCS) in figure 1

(comprising elements 2,3,and 5) that is connected to hosts 1a-1n. Figure 1 details components of

the SCS including a disk portion 21 for storing host information, a channel control unit 23 that is

an interface between the hosts to the SCS, a disk control unit 22 for interfacing with the disk

portion 21 as shown, a cache memory 222 for temporarily storing data sent and received to and

from the channel control unit and disk control unit (¶38) and a control memory 223 portion

(figure 2) for storing [management] information on the constitution of a plurality of logical

volumes formed by means of disk allocation on the disks 21 (¶39). Further, another control

memory portion (figure 9) is stored in the managing host computer 3 portion of the SCS. The

Examiner is regarding the collection of these control memory portions of the SCS to comprise

the --control memory--.

As shown in figure 2, control memory contains state information 64 for indicating

whether a logical volume (logical device) in the disk array is online. Further, information

regarding the path between the online logical volume and a host to which the logical volume is

currently connected is shown in column 107 of figure 9, which is stored in the control memory

portion stored in the managing host computer portion of the SCS (¶18).

As per claim 2, Kitamura teaches in figures 6 and 7 a host sending information to the

SCS (figure 6, step 1204) to cancel the path between the online logical volume contained in the

information and the host.

As per claim 3, Kitamura shows in figure 4 and 5 a host sending information for

obtaining online information from the SCS (figure 4, step 1003) and receiving logical volume

online information (i.e. target ID, LUN, etc) from the SCS in figure 4, step 1004; and figure 5,

step 1107.

As per claim 4, when the online information on the logical volume is received from the

SCS as stated supra, the logical volume online information is displayed (i.e. informed to the user)

in step 1006 of figure 4.

As per claim 5, Kitamura teaches in ¶44 that when trouble occurs to one of the disk

comprising the logical volume, the logical device management table [comprising recovery

instruction information such as which logical device number is having trouble and which logical

devices are available] is received at the managing host computer 3 portion of the SCS, which in

turn, performs a recovery operation involving the changing of the logical volume configuration.

The online information for the logical volume is displayed at the managing host computer 3

portion of the SCS as shown in figure 2.

As per claim 6, online information for the logical volume is reported to the host as shown

in figure 5, step 1107. This online information can be sent during the creation of a logical

volume as taught in ¶60 and steps 1103,1108,1109, and 1110 of figure 5, and in order to indicate

that a device is offline due to trouble (logical device k+1 for example in figure 2), the logical

volume much have been created in the first place. In other words, it can be seen that the logical

volume is created and online information sent to the host first before recovery instruction

information (as discussed with respect to claim 5 supra) can be sent to the managing host portion

3. The logical volume reconfigured (¶44) by the managing host portion 3 only after recovery

instruction information has been sent.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in
> section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are
> such that the subject matter as a whole would have been obvious at the time the invention was made to a person
> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the
> manner in which the invention was made.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kitamura et al.

(U.S. Patent Application Publication No. 2002/0091828), as applied to claim 1-6 above, in view

of Kusters et al. (U.S. Patent No. 6,681,310).

As per claim 7, Kitamura teaches that logical volumes may go offline due to trouble

issues (¶44), but does not specifically teach a recovery program or notify a system to recover the

logical volume and correct the trouble. Kusters teaches a system for automatically handling

faults as well as configure volumes, monitor performance, and dynamically tune performance

(column 7, lines 42-52). Further Kusters teaches being able to manage the mentioned tasks from

host computers (via an API interface) where the host do not need to have detailed knowledge of

the storage device system that is providing the logical volumes for host access (column 7, lines

55-59). Therefore, it would have been obvious to one having ordinary skill in the art at the time

the invention was made to have combined the storage control system of Kitamura with the

management task implementation system of Kusters in order to have automatically fixed the

"trouble" issues mentioned in Kitamura that result in having to reconfigure the logical volumes

and have part of the disk array 21 of Kitamura no available. Further Kitamura could have used

the teaching of Kusters to dynamically tune logical volume performance.

Kusters teaches receiving a command from a requesting application (host) for online

information of logical storage volumes and then reporting the information back to the requesting

host (column 9, lines 48-54). A variety of status information can be communicated from this

report (column 9, lines 41-47); the status information can be online information (column 4, lines

42-43). After volume online information is reported back to the host, the host can request to

cancel a logical volume to which it is attached as discussed in the rejection of claim 2 supra

(figure 6, step 1204, of Kitamura).

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kitamura et al.

(U.S. Patent Application Publication No. 2002/0091828), as applied to claim 1-6 above, in view

of Lubbers et al. (U.S. Patent Application Publication No. 2003/0188119).

As per claim 8, Kitamura does not specifically teach bringing recovery-destination

logical volumes offline before recovery; however Kitamura does teach that logical devices

(logical volumes) can be mirrored (i.e. RAID-1 - figure 2) and therefore one of the mirrored

drives would need to be recovered if it occurred trouble - ¶44 of Kitamura - (i.e. data is not

consistent between the mirrors). Lubbers teaches in ¶74 that if data is not consistent between

mirror volumes, that the destination volume (logical device to contain duplicate data) goes

offline with respect to the hosts in order to be repaired. Therefore, it would have been obvious to

one having ordinary skill in the art at the time the invention was made to have combined the

storage and control subsystem of Kitamura with the mirror repair teaching of Lubbers in order to

have prevented a host from accessing the destination logical volume device mirror while it was

being repaired (reading and copying data from the target logical drive to which it is mirrored)

and possibly reading erroneous data. Note that Kitamura automatically places the logical volume

offline when trouble is sensed (configuration of logical volume is changed - ¶44).

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kitamura et al.

(U.S. Patent Application Publication No. 2002/0091828), as applied to claim 1-6 above, in view

of Iwamura et al. (U.S. Patent Application Publication No. 2003/0225861).

As per claim 9, Kitamura does not specifically teach or show the disk controller 22

preventing a path cancellation. Kitamura does, however, show that multiple hosts can be using a

common logical volume (figure 9 - hosts A and B using logical device 2) but does not show how

the SCS system would handle the case of one of the hosts accessing the logical device while the

other host attempting to set the logical device to an offline state (i.e. path cancellation) - refer to

figure 7, step 1302).

Iwamura teaches in ¶151 that if a disconnection is to occur to a logical volume to which a

present access is being performed, the current access may be completed before the path from the

logical volume to the device (i.e. host) performing the access is cancelled. Therefore, it would

have been obvious to one having ordinary skill in the art at the time the invention was made to

have combined the storage and control subsystem of Kitamura with the teaching of preventing

path cancellation of Iwamura in order to have prevented one of the host devices that is currently

assigned to a logical device of Kitamura from setting the logical device offline while another

host is currently accessing the device thereby maintaining data integrity of the system of

Kitamura.

Allowable Subject Matter

Claims 10 is objected to as being dependent upon a rejected base claim, but would be

allowable if rewritten in independent form including all of the limitations of the base claim and

any intervening claims.

Claims 12-19 are objected to, but would be allowable if rewritten to overcome the

objections stated above.

Claims 11 and 20 would be allowable if rewritten to overcome the rejection(s) under 35

U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of

the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: the

prior art of record does not explicitly teach nor reasonably suggest.

As per claim 10, the prior art of record does not teach or reasonably suggest when taken

alone or in combination a storage control subsystem receiving a referral request for path

information from a host that itself received from another storage control subsystem.

Specifically, Kitamura does not teach another SCS (as defined with respect to claim 1 supra)

sending a request to a host [and the host forwarding the request onto a specific SCS] for path

information and then canceling the path if the information contains path cancellation

information.

As per claim 12, the prior art of record does not explicitly teach nor suggest alone or in

combination each limitation of claim 12. Specifically, Kitamura does not teach the examination

of the sub-volume (i.e. the target volume of a mirror pair as defined in the Applicant's

specification pages 2-3) during creation of a mirrored pair (i.e. a set of RAID-1 volumes) as well

as utilizing a channel control unit to perform a second examination with regard to the other hosts

are currently using the target subvolume.

Claims 13-19 are allowable as being dependent on objected to base claim 12.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Matsumoto et al. (U.S. Patent No. 6,851,020) teaches that path cancellation must occur before executing backup operations to a target logical volume (column 7, lines 11-29).

Raz et al. (U.S. Patent No. 5,860,137) teaches a method for host to connect and disconnect to a plurality of logical volumes.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shane M Thomas whose telephone number is (571) 272-4188. The examiner can normally be reached M-F 8:30 - 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matt M Kim can be reached at (571) 272-4182. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Shane M. Thomas

HONG CHONG KIM
PRIMARY EXAMINER